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LETTER REGARDING U S AIR FORCE RESPONSES TO U S EPA REGION VI COMMENTS ON DRAFT BASEWIDE BACKGROUND STUDY REPORT NAS FORT WORTH TX
4/17/1998
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

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NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
BROOKS AIR FORCE BASE TEXAS

17 Apr 98

MEMORANDUM FOR TNRCC
INDUSTRIAL AND HAZARDOUS WASTE DIVISION
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FROM: HQ AFCEE/ERB
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SUBJECT: Basewide Background Study, Jan 97, Project 96-8105,
Contract 41624-94-D-8046/0021, Carswell AFB

1. Attached are responses to your comments on the Draft Basewide Background Study Report (prepared by Jacobs Engineering, January 1997). In response to the 20 Jan 98 TNRCC comments one and two, the document will be revised as indicated. In response to comment three, the Air Force will collect an additional 6 sediment samples. The purpose of this additional sampling will be to increase the sample population and increase the level of confidence in the background calculations. A final report will be issued following sample collection and analysis, showing the above revisions and new background calculations for sediment samples.

2. If you have any questions or comments concerning this effort please call me at (210) 536-6452.

CHARLES A. RICE
Team Chief
Base Closure Restoration Division

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1. Response to EPA Comments

RESPONSE TO TNRCC COMMENTS ON BASEWIDE BACKGROUND STUDY

COMMENT: *Section 2.2.5 Groundwater Sampling:* Ground water samples were collected using both low-flow sampling techniques and bailers. Ground water UTLs were independently calculated for each sampling method. The review of *Table 2-3 Field Parameter Measurements of Low-Stress Collected Samples* and *Table 2-4 Field Parameter Measurements for Bailer-Collected Samples* indicate that ground water samples collected via bailers cannot be considered representative of native ground water conditions due to unacceptably high turbidity levels. Turbidity readings for 9 of the 12 wells sampled with bailers were off the scale of the turbidity meter (e.g., >999 NTUs); with turbidity for the other three (3) wells ranging from 110 to 730 NTUs. These same wells, when sampled using low-flow or "low-stress" methods, exhibited turbidity readings which ranged from 0 to 9 NTUs. The purpose of conducting a background study is to establish, with a certain degree of confidence and coverage, the naturally occurring concentration of inorganic (metals) constituents present in site media (soils, ground water, sediments and surface water) unaffected by waste management practices. The use of highly turbid ground water samples to calculate a background UTL will typically result in UTLs that are biased high due to the presence of clay "fines" or particulate being artificially entrained in the ground water sample as a result of the sampling procedure. These "fines" are not representative of colloidal material that may actually be mobile within the aquifer. For the majority of constituents, the UTLs calculated from bailer derived samples are higher than those calculated for the low-stress samples. Consistent with current EPA guidance and research, the TNRCC's Federal Facilities Team believes that low-flow of "low-stress" sampling provides data that is the most representative of native ground water conditions.

RESPONSE: A sentence will be added to this section and to the Executive Summary indicating that TNRCC does not approve the background values for groundwater concentrations obtained using bailer purging techniques. The data obtained using bailer purging techniques will be provided for reference only. This statement will help avoid confusion for anyone using the background values during work at NAS Fort Worth in the future.

Samples were collected using both low-flow and bailer sampling techniques for the purposes of comparison of the effects of turbidity on the analytical results. Wells were sampled using bailers also to provide comparison UTLs for historical data collected using bailers. If all sampling in the future is conducted using low-flow techniques, only the background data collected using the same methodology will be relevant.

COMMENT: It is suggested in the Executive Summary that low-flow ground water sampling "approximates filtered samples". This is incorrect. The low turbidity values typically attained with the low-flow method are the result of sampling a monitoring well in a manner that greatly reduces the introduction of artificially suspended material. Bailers on the other hand can greatly bias the sample by introduction of artificially suspended material that is not representative of native aquifer conditions. In addition,

bailers may chemically alter the sample through oxidation as well as causing the volatilization of volatile organic compound from the sample. Research has shown that low-flow sampling techniques provide more accurate and reliable ground water results than do other sampling methods.

RESPONSE: References to filtered and unfiltered samples will be removed from the Executive Summary section of the report.

COMMENT: *Table ES-1 Summary of Background UTLs by Matrix:* The proposed stream sediment UTLs are not supported by the actual field data collected during the background study. As was the case for most of the UTLs proposed in the background study, the stream sediment UTLs were calculated on log transformed data. Unlike the UTLs proposed for other media, however, the stream sediment UTLs are typically twice the highest detected concentration in field data with some UTLs approaching four (4) times the highest detected concentration. In example, lead was detected in all eight (8) sediment samples collected with a maximum concentration of 26.9 mg/kg. The proposed UTL, however, calculated with log transformed data, is 104 mg/kg. The review of *Appendix F Statistical Calculation Support Tables* revealed that stream sediment UTLs were also calculated using the raw (actual) field data. The UTLs calculated from "raw" data appear to more closely match the actual data (e.g., for lead, a UTL of 35.6 mg/kg versus 104 mg/kg). The use of UTLs calculated on the raw data would seem to be an acceptable alternative to the proposed log-based UTLs.

RESPONSE: The calculations of background values as presented in the document are valid, based on a sound statistical approach. The procedure for calculating UTLs outlined in *Section 4.0* and as illustrated in *Figure 4-1* of the *Basewide Background Study* dictates that if the log-transformed data passes the Shapiro-Wilk test for normality, the UTL will be calculated based on the log-transformed data regardless of the outcome of the Shapiro-Wilk test on raw (actual) data. The fact that the UTLs are often higher, and in some cases significantly higher than the maximum concentrations, is a function of the small sample population (8 samples for sediment), log normally distributed data, and a high standard deviation of the sample population. This is to be expected since the 95 percent UTL represents an estimate of the 95th percentile of the data set, and log-normal data with a high standard deviation have a strong positive skew. If a random sample of eight values is chosen from such a distribution, it is quite possible that the maximum value of the random sample will be less than the 95th percentile value of the distribution.

For the example cited in the comment, lead in stream sediment samples, the *Appendix F Statistical Calculation Support Tables* display probability plots for the raw and log-transformed data. The probability plot for the log-transformed data is clearly more linear than the plot for the untransformed data. A histogram of the data would also display a strong positive skew. These observations support the use of log-transformed data in preference to untransformed data, even though the calculated UTL greatly exceeds the maximum observed value.

Additionally, this effect is not limited to the sediment data set. A comparison of the calculated UTL to the maximum concentration reveals that, on average, the UTLs for sediment are 83 percent greater than the maximum concentration. As a comparison, the calculated UTLs were 51 percent higher than the maximum concentration for groundwater collected using the low-flow method, 92 percent higher for groundwater collected with a bailer, and 94 percent higher for surface water samples. Only for soil samples were the calculated UTLs less than the maximum on average. Overall, the calculated UTLs exceeded the maximum values for approximately one-half the data sets.

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